California Global Warming Solutions Act of 2006

Implementation of Mandatory Reporting of Greenhouse Gas Emissions

California Air Resources Board
June 20, 2008
Cal/EPA Headquarters, Sacramento

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Agenda

- Introduction and Overview
  - Process and schedule
- Basic Reporting Requirements
  - What's new, preparing for reporting
- Overview of Reporting for General Stationary Combustion Sources
  - Combustion and cogeneration methods
  - Case example
- Review of Verification Requirements
- Questions and Comments

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Participation Information

- Workshop materials:
  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm
- Regulation and Staff Report (includes proposed Regulation):
  http://www.arb.ca.gov/regact/2007/GHG2007/GHG2007.htm
- Webcast information:
  http://www.calepa.ca.gov/broadcast/
- Email comments during webcast:
  auditorium@calepa.ca.gov

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Support Documentation, Reporting Tool and Training

- Sector-specific technical discussions
- Staff developing supporting documents
  - Present requirements in easy-to-follow format to guide reporting by sector
- Web-based GHG reporting tool
  - Beta testing Fall 2008
  - Tool to assist with reporting process
- Verifier training

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Completing the Rulemaking Process

- Regulation approved by Board December 2007
- Modifications released for comment May 15 – June 5, 2008
- Staff reviewing comments, preparing responses as part of Final Statement of Reasons (FSOR)
- FSOR completion expected in July
- Subject to OAL approval, effective later this summer

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Reporting Requirements

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Regulation Organization

- Applicability – Who has to report
- Subarticle 1 – General Requirements
  - Definitions
  - General reporting requirements
  - Reporting and verification schedule
  - Record keeping, confidentiality, enforcement
- Subarticle 2 – Sector Specific Requirements
  - Cement, electric generating, retail providers, cogeneration, refineries, hydrogen plants, large stationary combustion sources

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Regulation Organization (continued)

- Subarticle 3 – Calculation Methods for Multiple Sectors
  - CO_2 emissions from combustion using emission factors, heat content, carbon content, CEMS, etc.
  - CH_4 and N_2O emissions
  - Indirect energy use
- Subarticle 4 – Verification Requirements
- Appendix – Compendium of Emission Factors for reporting

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Applicability (§95101):

- Cement plants
- Oil refineries ≥ 25,000 MT CO_2/yr
- Hydrogen plants ≥ 25,000 MT CO_2/yr
- Electric generating facilities (≥1MW & ≥2,500 MT CO_2)
- Electric retail providers and marketers
- Cogeneration facilities (≥1MW & ≥2,500 MT CO_2)
- Stationary combustion sources emitting ≥ 25,000 MT CO_2/yr

Exempt Sources

- Emergency & backup generators
- Portable equipment
- Hospitals, primary & secondary schools
- Nuclear, hydro, wind, solar generating facilities

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Reporting: General Requirements (§95103(a))

- Annual reporting for each facility or entity subject to regulation
- The operator -- party with "operational control" – has reporting responsibility
- Report emissions for specified facility sources and gases by fuel type
  - Additional data as specified

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What's New (since October 2007 proposal)

- Clarifications to text
  - Applicability, definitions, equations
- De minimis limit changed from 10,000 to 20,000 tonnes
- Interim data collection procedure during certain breakdowns
- All verification to begin in 2010

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What's New (since October 2007 proposal)

- Fuel measurement accuracy revised from 2.5 percent to 5 percent
- Fuel consumption to be reported at process unit level where metered
- Test options added for waste-derived fuels
- Additional year for CEMS installation
- Verifiers also subject to deadlines

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What's New (since October 2007 proposal)

- Power: specified out-of-state transactions optional, multijurisdictional reqts clarified
- Cogeneration: simplified reporting for small self-generation cogen facilities
- Refineries: CEMS, in-line monitoring options, fugitive emissions changes
- Hydrogen plants: mass balance equation corrected
- See Notice for more complete listing: http://www.arb.ca.gov/regact/2007/ghg2007/ghg2007.htm

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Reporting Schedule

- Reports Due by April 1, 2009
  - General Stationary Combustion (except oil and gas sector)
  - Electricity Generating and Cogeneration Facilities not part of reports due June 1
- Reports Due by June 1, 2009
  - Petroleum Refineries
  - Hydrogen Plants
  - Cement Plants
  - Electricity Retail Providers and Marketers

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Verification Schedule

- Verification optional for 2009 submittal
- Annual or triennial verification, based on sector
- When required, verification opinion due within 6 months following report due date (Oct. 1 or Dec. 1)

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Preparing for Reporting: 2009

- Must report 2008 emissions in 2009
- Emissions calculations may be based on best available data and methods
  - Fuel usage by type x default emission factor
- Consider whether you want your 2009 report third-party verified

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Preparing for Reporting: 2010

- 2010 report of 2009 emissions must meet full requirements of the regulation
- Complete installation of needed measurement devices by end of 2008
- Begin collecting fuel activity data measurements by January 1, 2009
- All reporters must verify the 2010 emissions data reports

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Comments on general reporting requirements?

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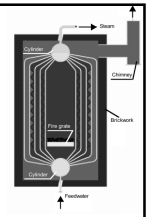
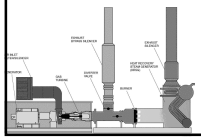
General Stationary Combustion Facilities (GSCs)

(§95115)





GSC Facilities Overview

- 25,000 metric tonnes CO_2 from stationary combustion
  - Facility-wide threshold
  - Does not include process, mobile, indirect electricity or fugitive emissions
- Broad and diverse industry sectors
- Process emissions not required at this point

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Meeting the Threshold

- Emissions based on single facility emissions only
  - Each facility counted separately even if multiple facilities under common ownership
- Threshold determination based only on CO_2 emissions from stationary combustion
  - Does not include purchased electricity, heating, cooling
  - Does not include mobile, fugitive, or process emissions

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Major GSC Sectors Affected

(only if ≥ 25,000 metric tonnes/yr CO_2 from combustion)

- Natural gas transmission
- Industrial gases
- Paperboard manufacture
- Colleges and universities
- Oil production
- Food processing
- Steel foundries
- Mineral processes
- Glass container
- Malt beverages

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How Will You Know If You Are a GSC Facility?

- ARB is working to inform all GSC facilities emitting ≥25,000 metric tonnes of CO_2 of requirements
- Fuel usage can be used to quickly approximate CO_2 emissions
  - Appendix A provides fuel usage and emissions factors to estimate CO_2 emissions

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Approximating Emissions Based on Amount of Fuel Used

Fuel Type	Fuel Units	Kg CO_2/Unit	Amount of fuel to produce 25,000 MT CO_2	Amount of fuel to produce 2,500 MT CO_2
Natural Gas[1]	SCF	0.05	459,140,464	45,914,046
LPG (energy use)	Gal	5.79	4,317,757	431,776
Distillate Fuel	Gal	10.14	2,466,011	246,601
Motor Gasoline	Gal	8.80	2,841,174	284,117
Landfill Gas	MMBtu	52.03	480,503	48,050
Coal[2]	Short Ton	2,082.89	12,003	1,200
Jet Fuel	Gal	9.56	2,614,682	261,468
Kerosene	Gal	9.75	2,562,972	256,297
Petroleum Coke	MMBtu	102.04	244,996	24,500
Crude Oil	Gal	10.29	2,430,348	243,035

[1]Unspecified
[2]Unspecified Other Industrial

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GSC Reporting Requirements

- Stationary combustion emissions estimation:
  - Calculate from fuel use and ARB default emission factors (§95125(a)-(b))

    or
  - Calculate using measured fuel heat value or carbon content (§95125(c)-(d), (h))

    or
  - Continuous emissions monitoring if available (§95125(g))

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Calculating Stationary Combustion Emissions (EF)

- Stationary turbines, boilers, internal combustion engines, flares, etc.
- GSC Methodology:
  - Fuel use calculation

    *Total annual emissions = emission factor (i.e., emissions/fuel used) * annual fuel use (by each fuel type)*
- Regulation provides emission factors for various fuels (Appendix A)

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Example ARB Emission Factors

Fuel	Kg CO_2/MMBtu
Bituminous Coal	93.40
Natural Gas (unspec.)	53.02
Distillate Oil/Diesel	73.10
Gasoline	70.83
Wood Waste	93.90
Biogas (includes CO_2 pass-through)	104.06

Source: ARB GHG Regulation, 15-day review draft, May 15, 2008

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Other GSC Reporting Requirements

- Report indirect (purchased) energy use in KWh, Btu (emissions not required)
- Cogeneration as specified in §95112
- Electric generation as specified in §95111
- Oil and gas production sources required to test fuel

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GSC Reporting Deadlines

- Data reports for GSCs due each April 1, beginning in 2009 for 2008 emissions
- Verification required on triennial schedule
- First due October 1, 2010 for 2009 emissions

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What You Should Do Now GSCs

- Become familiar with regulation
  - §95103, 95104, 95112, 95115, Appendix A
- Sign up on ARB's email list serve
- Set up systems for tracking fuel and energy use during 2008
- Confirm availability of EFs for fuel (Appendix A)
- Evaluate need for fuel testing based on fuel types

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Comments on GSC reporting requirements?

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Cogeneration Facilities Reporting Requirements

(§95112)

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Cogeneration Facilities: Mandatory Reporting

- Cogeneration includes Self-Generation Facilities
- $\geq$ 1 MW and $\geq$ 2500 metric tonnes CO_2
- Cogeneration Facilities in other Sectors
  - Refineries
  - Power/Utilities
  - Cement Plants
  - GSC ≥ 25,000 metric tonnes CO_2

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Cogeneration Reporting

- Cogeneration Facility
  - Industrial structure, installation, plant, building, or self-generating facility
  - Sequential generation of multiple forms of useful energy in a single, integrated system.
- Responsible Reporting Party
  - Management/Operational Control

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§95112(a) Greenhouse Gas Emissions Data Report

1) Facility Level and Generating Unit Information
2) Cogeneration System
3) Electricity Generation
4) Thermal Energy Production
5) Distributed Emissions
6) Indirect Electricity Usage

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§95112(b) Calculation of CO_2, N_2O, and CH_4 Emissions

1) CO_2 Emissions from Stationary Combustion
   - 95111 (c), including biomass CO_2
2) GHG Emissions from Processes and Fugitive Sources
   - 95111 (e) – (h)
3) N_2O and CH_4 Emissions from Stationary Combustion
   - 95125 (b)
4) Distributed Emissions
   - 95112 (b) (4)
     A. Topping Cycle Plants
     B. Bottoming Cycle Plants

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Types of Cogeneration

- Topping Cycle Plants
  - Energy input used to produce useful power output
  - Waste heat used to provide useful thermal energy
- Bottoming Cycle Plants
  - Energy input applied to useful thermal energy
  - Waste heat used for power production

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§95112(b)(4) Distributed Emissions

- Topping Cycle Plants
  - Efficiency Method
  - Distributed between Thermal Energy and Electricity Generation
- Bottoming Cycle Plants
  - Detailed Efficiency Method
  - Distributed between Manufactured Products, Thermal Energy, and Electricity

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Inputs for Emissions Distribution

- Facility level and generating unit information by fuel type:
  - F = Total fuel input, MMBtu
    - For bottoming cycle plants, include stationary combustion associated with manufacturing product and supplemental firing.
  - E_T = Emissions from stationary combustion, metric tonnes CO2
    - For bottoming cycle plants, include emissions from stationary combustion associated with manufacturing product and emissions from supplemental firing.

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Inputs for Emissions Distribution

- Topping cycle and bottoming cycle:
  - P = Electric power generated, MMBtu (MWh * 3.413 = MMBtu)
  - e_P = Efficiency of electricity generation, if known
  - H = Total useful thermal output, MMBtu
  - e_H = Efficiency of thermal energy production, if known

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Inputs for Emissions Distribution

- Bottoming cycle plant:
  - F_S = Fuel fired for supplemental firing in the duct burner of the heat recovery steam generator, MMBtu
  - HRSG = Output of heat recovery steam generator, MMBtu
  - H_{ST} = Input steam to steam turbine, if measured, MMBtu

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Detailed Efficiency Method: GHG Emissions Distribution

Electricity	Thermal Energy
$E_P = E_T - E_H - E_M$	$E_H = \frac{H/e_h}{H/e_h + P/e_p} \times (E_T - E_M)$

Where:
E_P = Emissions distributed to electricity production
E_T = Total direct emissions of the CHP System
E_H = Emissions distributed to thermal energy production
E_M = Emissions distributed to production of manufactured product
H = Total thermal output, MMBtu
e_H = Efficiency of steam (or heat) production
P = Total electricity output, MMBtu (MWh*3.413 = MMBtu)
e_P = Efficiency of electricity generation

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Comments on Cogeneration reporting requirements?

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Reporting Case Study GSC and Cogeneration Facility Mix

- Determine applicability
- Identify key emission sources
- Identify calculation methods
- Compile needed input data and resources
- Calculate and report emissions
- Verification

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Determine Applicability

- Manufacturing facility
- Cogeneration unit on-site
  - 2 megawatt & > 2,500 tonnes CO_2/yr
- Boilers
  - Combust 500,000 MMBtu/year
- Meets applicability for GSC (>25,000 tonnes CO_2/year) and Cogen
- Report GSC and Cogen emissions

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Identify Key Emission Sources

- Boilers (2) – natural gas fired
- Cogeneration unit – natural gas (~50%) and biomass (~50%) fired
- Backup generator (exempt)
- Portable equipment (exempt)
- Mobile trucks, forklifts (voluntary reporting only)
- Energy purchases (report only use and supplier, not emissions)

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Identify Calculation Methods

- Boilers
  - Use default emission factors: §95125(a) and Appendix A, Table 4
- Cogeneration
  - Compute Cogen emissions §95112
  - Calculate emissions from natural gas §95125(c)-(d)
  - Calculate emissions from biomass § 95125(c)-(d)
  - Distribute emissions §95112

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Compile Needed Input Data and Resources

- Fuel use/consumption records
- Measured heat content for natural gas §95125(c) from supplier
- Biomass emissions using §95125(c) - (d)
  - Heat content, carbon content

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Calculate and Report Emissions

- Calculate emissions
- Report using ARB reporting tool
- Facility official certifies data
- Verification of data

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Verification, Final Steps

- Contract with verification body
- Verifier conducts a data review
- Revise emissions data report as needed
- Verification body issues verification opinion
- Reporting complete
  - Maintain records
  - Prepare for next year

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Comments on GSC and Cogen Case Study?

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Verification
(§95130-95133)

- Requirements
- Accreditation
- Conflict of Interest

Third-Party Verification Required, Starting in 2010

- Facilitates linkages and is consistent with international standards
- Experience with voluntary reporting (CCAR) shows the need
- Broad set of sources, complex calculations demand expertise
- Will enhance the credibility and value of emissions reports

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Annual or Triennial Verification

- Annual third-party verification for:
  - Refineries
  - Hydrogen plants
  - Oil and gas production facilities
  - Retail providers
  - Fossil-fueled power plants and cogeneration facilities ≥ 10 MW
- Third-party verification required at least triennially for other sources

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Verification Services

- Verification Plan
- Site visits to identify sources and review data management systems
- Sampling Plan
  - Assess uncertainty risk of data management system, data acquisition equipment, emissions calculations
  - Ranking of most significant and uncertain sources
- Data checks focus on areas with high risk of uncertainty as determined in sampling plan

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Verification Services

- Comparison of verifier data checks with reported data
- Overall differences exceeding 5 percent are considered significant
- Verification products
  - Detailed report to facility
  - Verification opinion to both facility and ARB

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Pre-verification Process

- ARB will approve verification teams before verification activities take place
- Teams must demonstrate acceptable level of conflict-of-interest and expertise for verifying the facility they contract with
- Team must include a specialist for retail provider, marketer, petroleum refinery, hydrogen plant, cement plant

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Conflict of Interest

- Term Limit
  - Verification body to be changed after 6 years of verification services (two cycles)
  - Allowed to resume with client after 3 years off (one cycle)
- Conflict of Interest Policy
  - Verification body and verifier may not provide both consulting and verification services within a 3-year period.

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ARB Accreditation

- Verification Bodies
- Lead Verifiers
  - 'Grandfathering' of lead verifiers
- General Verifiers
- Sector Specific Verifiers
  - Electricity Transactions
  - Refineries and Hydrogen Plants
  - Cement Plants

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Verification Oversight

- ARB staff responsible for enforcing regulation
- Verification process will assist compliance efforts
- Targeted review of submitted data and verifiers

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Verification Guidelines Development

- ARB is drafting verification implementation guidelines to present requirements in easy-to-follow format
- Information on training/accreditation will be posted later

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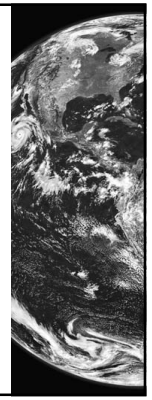
GHG Emissions Verification Website
http://www.arb.ca.gov/cc/reporting/ghg-ver/ghg-ver.htm



Verification Comments?

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Next Steps

- Technical Discussions by Sector
- ARB Staff is writing GHG reporting support documents
- Call or e-mail staff with your questions
- Training Opportunities (reporting and verification)
- Draft Reporting Tool

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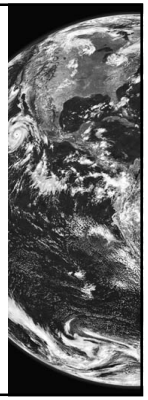

Thank you for attending.

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